

AMOEBA PARASITICA. A NEW PROTOZOAN  
INFESTING SHEEP.

BY R. VON LENDENFELD, PH.D.

(PLATE VI.)

Some weeks ago I was commissioned by the Hon. the Minister of Mines to investigate some diseased sheep in two different localities in New South Wales, at Quirindi in the Liverpool Plains and near Young.

I forwarded my reports in due course to the department, but thinking that my researches might also be of some general scientific interest I publish them here.

The sheep are affected by a disease which appears very similar to epithelial cancer and was met with on the feet behind the hoofs and also on the lips and nostrils and the gums of lambs.

The epithelium in these places grows with pathological rapidity, the horny layer produced soon attains a thickness of 3—5 mm., the wool drops out in the diseased parts and below the thick outer layer a festering process sets in.

After some time a new Epithelium makes its appearance below the festering layer. Then, provided the lamb does not die, the thick horny layer is thrown off like scurf and the Epithelium below attains new wool and replaces the old skin—the lamb has recovered.

In studying the circumstances in which these sheep live, I found, that they invariably were exposed to being wounded in some way or another in those places, which eventually developed the disease, —blistered by standing on rocks heated by the sun after they had been standing in water for several hours or pricked by the spines of the variegated thistle under the shade of which they had, in consequence of the prevailing drought, to find their food.

These traumatic influences are not, however, the actual cause of the disease. It is produced by an Amœba which enters the wounds and multiplies rapidly in the Epithelium causing very strong irritation.

On the one hand the sheep are continually rubbing the diseased parts, and on the other, the microscopic investigation shows, that the Rete Malpighi in those places is highly inflamed, extending centrifugally so as to form large protruberances and rapidly producing Epithel-cells, between the successive layers of which the parasite is imbedded and so rendered harmless. The disease is very infectious. Burning out the affected places and dipping in poisonous solutions have been found in some cases reported to me to yield good results and to accelerate the healing process, at the same time diminishing the percentage of deaths. This treatment I had previously recommended in my report to the department.

Between the layers of horny substance which are either concentric and thimble-shaped (fig. 1), or show an alveolar reticulate structure (fig. 2.), I discovered granular masses with a nucleus in each, and of course was inclined to consider them as the eggs of some parasitic insect, particularly in consequence of their large size 0·05—0·1 mm. On examining extensive series of sections I found, however, that they never developed into insects, and further that they evidently multiplied. I found (fig. 3) on several occasions the granular mass divided into two portions, with a nucleus in each part. Never were there more than two nuclei in one and the same granular mass.

In the cases where the small wart-shaped excrescences of the skin, with which the disease always begins, had a reticulate structure (at Young) (fig. 2), the granular masses were found in several layers in the proximal part only, whilst the meshes of the distal part of the network (fig. 3) were empty.

In the cases where the protruberances consisted of concentric layers (at Quirindi) (fig. 1), there existed occasionally also in the distal part some small empty spaces, but mostly the granular bodies filled all the spaces between the horny layers. Here however,

the granular masses in the distal part had evidently undergone a change. No nucleus could be detected in them, and they were not nearly so readily colourable as the proximal ones with the nucleus.

I assumed on the ground of these observations that a parasitic protozoon of some kind or another entered the wounds mechanically made in the tender skins of lambs and there multiplied.

I subsequently made some experiments to find out whether this assumption was correct, as follows :—

The scurf in the lower portion of which there were many granular masses, with nucleus, was placed in fresh water in a small aquarium.

A small portion of the skin of a sound lamb was placed in a similar aquarium filled with water from the same source (boiled rain water.)

Infusoria and Bacteria made their appearance in both aquaria after a few days, but in the one with the diseased scurf only I found after four days several *Amœbæ*, in shape similar to an ordinary lobate *Amœba*. (Fig. 4.) These were most numerous after six days, and then rapidly vanished, so that there were apparently none left in ten days.

I believe I am justified in concluding from this observation that the cause of the disease is an *Amœba*, which I name, accordingly to its mode of life, *Amœba parasitica*, which, however, does not differ morphologically from the well-known, and as I believe, cosmopolitan *Amœba princeps* of Ehrenberg.

It is well-known that several fungi, in certain stages of their life, appear very similar to *Amœbæ*, and so it is not impossible that my *Amœba* is in some connection with them. I do not consider this probable, however, as I made no observation which might lead one to suppose that the *Amœba* ever divided into a multitude of swarming spores.

EXPLANATION OF PLATE VI.

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Fig. 1.—Part of diseased skin ; a protruberance, with concentric layers from the lip of a lamb at Quirindi. Chromic acid, picric acid-carmine, longitudinal section. C., Oc. I.

Fig. 2.—Part of the diseased skin ; a protruberance, with reticulate structure, from the nostrils of a lamb at Young. Chromic acid, picric acid-carmine. DD., Oc. I.

Fig. 3.—*Amœba parasitica* multiplying by fission fresh. F., Oc. I.

Fig. 4.—*Amœba parasitica* bred in the aquarium alive. F., Oc. I.